The Commonwealth of Massachusetts
Executive Office of Health and Human Services
Department of Public Health
Bureau of Environmental Health Assessment
250 Washington Street, Boston, MA 02108-4619

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May 2, 2000

Marge McGrath, Principal
Dolbeare Elementary School
340 Lowell Road
Wakefield, MA 01880

Dear Ms. McGrath:

At the request of the Wakefield Board of Health, an indoor air quality assessment was done at the Dolbeare Elementary School, in Wakefield, Massachusetts by the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health Assessment (BEHA). Reports of headaches and respiratory symptoms attributed to sewer gas odors prompted this request.

On March 23, 2000, a visit was made to this building by Cory Holmes, Environmental Analyst for BEHA's Emergency Response/Indoor Air Quality (ER/IAQ) program. Mr. Holmes was accompanied by Sam Stella of the Wakefield Board of Health, Patricia de Garavilla, Assistant to the Principal, and Captain Michael Sullivan of the Wakefield Fire Department. Testing included carbon monoxide (CO) and hydrogen sulfide (H_2S) (see Tables 1-2). Measurements were taken at several locations inside the building believed to be impacted by odors as well as outside for comparison to indoor levels. No measurable levels of CO or H_2S were measured in the building.

A mild sewer gas odor was noted in the reception area of the main office. It appears that the source of odors were sewer gas vent pipes on the roof. There are several reasons that these vent pipes were the most likely source of odors within the building:

1. the close proximity of sewer gas vent pipes to rooftop air-handling equipment (see Picture 1);
2. reports of odor complaints coincided with times of increased restroom usage and;
3. the isolation of odor complaints to areas solely serviced by rooftop air-handling equipment

It was believed that the odors were being distributed into the building via ceiling-mounted air diffusers located directly above the reception desk (see Picture 2). These air diffusers are connected to the rooftop air-handling unit (AHU) via ductwork. To support this theory, BEHA staff conducted a visual inspection of the roof and noted two sewer gas vent pipes in close proximity to the AHU (see Picture 1). The close proximity of these vent pipes to the AHU, in combination with certain weather conditions, can lead to sewer gas being drawn into the fresh air intake (called entrainment) and distributed to occupied areas in the building. The closest vent pipe was capped and was located approximately six feet diagonally from the AHU's fresh air intake (see Pictures 3 & 4).

It was believed that this vent pipe was capped originally to prevent the entrainment of sewer gas into the fresh air intake. However, the capping of the vent pipe can create a pressure buildup resulting in the back up of sewer gas odors. It is also important to note wind conditions on the day of the assessment. During the visit Southwest winds of 2-5 MPH were measured, conditions on the roof were noted to be such that any sewer gas being vented would be directed toward the fresh air intake (see Picture 2).

It was reported that strongest odor complaints coincided with increased restroom usage (e.g., lunchtime and recess). These reports tend to support the theory that entrainment of odors from the vent pipes by the rooftop AHU is the most likely source of sewer odors. Reports of odors have been concentrated in areas serviced by rooftop air-handling equipment (e.g., main office area, physical education instructor's office, etc.). However, odors have also been reported in adjacent areas, which BEHA staff believes is the result of odors drifting through open doors.

School officials reported that this building has had a history of sewer gas odors from other sources. On January 4, 2000 the Wakefield Fire Department responded to an incident involving odor complaints in the food preparation/cafeteria area (Appendix A). According to Fire Department responders, the odors were attributed to dried out floor drain traps (WFD, 2000). School maintenance personnel reported that they frequently pour water into drains in the school to maintain the seal of drain traps and to prevent odors from reoccurring.

In view of the findings at the time of the visit, the following recommendations are made:

1. Uncap and extend vent pipes in close proximity to air-handling equipment. The building code requires that pollutant sources must be ten feet away from and two feet above fresh air intakes (BOCA, 1993, SBBRS, 1997). An extension several feet above the fresh air intake may be needed to prevent sewer gas entrainment.
2. Consider contacting the building architect and town inspectional services to assist in the identification of possible sources of sewer gas odors (e.g., HVAC systems, maintenance closet sinks, rest room floor drains, unused/broken sinks and/or water fountains, etc.).

3. Use local exhaust ventilation and isolation techniques to control for odors and/or pollutants if necessary.
4. Continue to pour water down floor drains on a regular basis, increase frequency if needed.

We believe that the indoor air quality within this building can be improved with the implementation of these recommendations. A full report denoting general indoor air testing conducted in the remainder of the building shall follow this letter.

We hope you find this information helpful. If you are in need of further information or help, please feel free to contact our office at (617) 624-5757.

Sincerely,

Suzanne K. Condon, Director
Bureau of Environmental Health Assessment

cc\ Michael Feeney, Chief, ER/IAQ, BEHA
Cory Holmes, ER/IAQ, BEHA
Sam Stella, Wakefield Board of Health
Jim Nugent, Director, Wakefield Health Department
Terrance Holmes, Superintendent, Wakefield Public Schools
Patricia de Garavilla, Assistant to the Principal
Peter Evangelista, Acting Director of Buildings and Grounds
Captain Michael Sullivan, Wakefield Fire Department

References

BOCA. 1993. The BOCA National Mechanical Code/1993. 8th ed. Building Officials & Code Administrators International, Inc., Country Club Hills, IL.

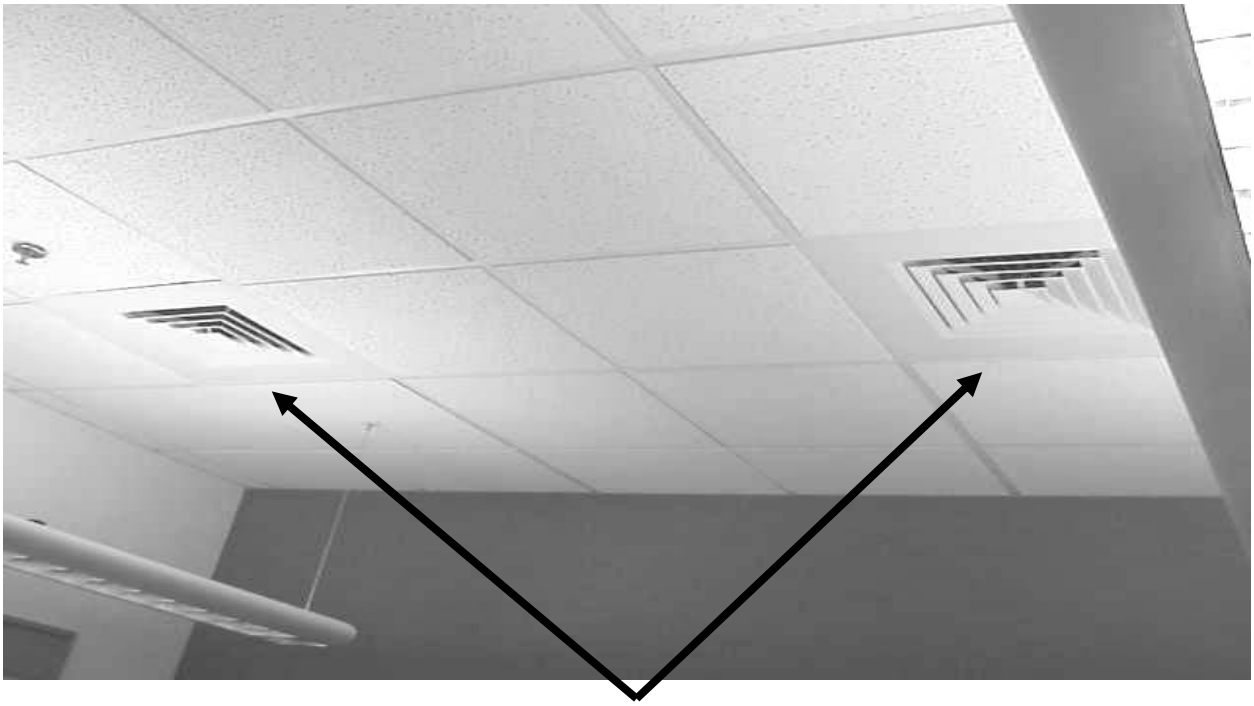
SBBRS. 1997. Mechanical Ventilation. State Board of Building Regulations and Standards. Code of Massachusetts Regulations. 780 CMR 1209.0

Wakefield Fire Department. 2000. Incident Report # 20. January 4, 2000`

Picture 1

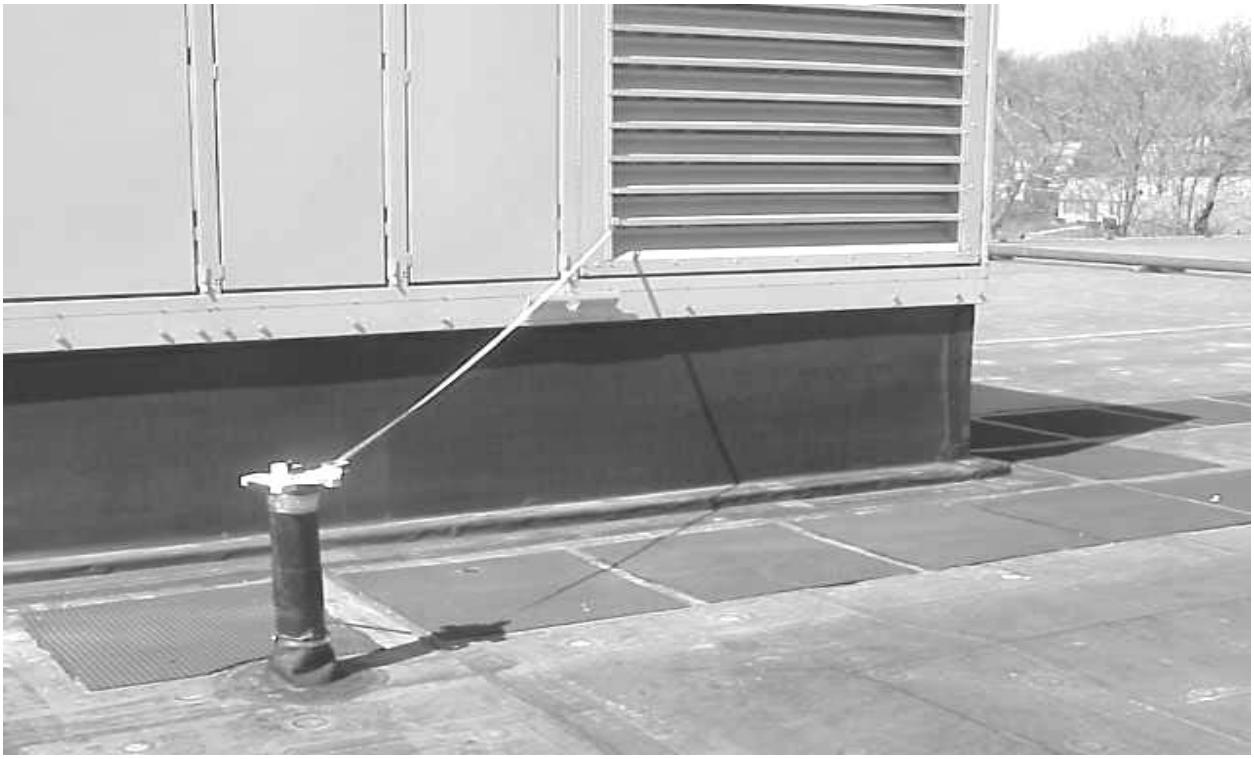
Sewer Gas Vent Pipes Noted on Roof Downwind from AHU
Arrow Indicates Wind Direction the Day of the Assessment (3/23/00)

Picture 2



Ceiling-Mounted Air Diffusers, Connected to Rooftop AHU in the Main Office (Secretaries Area)

Picture 3



Sewer Gas Vent Pipe in Close Proximity (~ six feet) to AHU Fresh Air Intake

Note Vent Pipe is Capped

Picture 4

Capped Sewer Gas Vent Pipe Noted near AHU Fresh Air Intake

INCIDENT REPORT

WAKEFIELD FIRE DEPARTMENT

Revised Report

A	FDID# 17-305	Incident # 20	If exposure	Date 01/04/00	Day of Week 3 Tue	Alarm Time 1318	Arrival Time 1321	In Service 1339	EMS Arrival
B	SITUATION FOUND		Action Taken		FIXED PROPERTY USE (Occupancy)		IGNITION FACTOR		
C	47 Chemical ODOR		3 Investigation only		213 Elementary School				
D	CORRECT ADDRESS 340 LOWELL STREET				ZIP CODE		CENSUS TRACT		
	OCCUPANT NAME				TELEPHONE #		ROOM or Apt.		
E	OWNER NAME			ADDRESS			TELEPHONE		
F									
G	Method of Alarm 1 Phone direct			Haz-Mat Present	Engines 1	Aerials	Mutual Aid		
	District	Group 3	Number of alarms		Tankers	Other vehicles			
H	Number of Personnel 4	Box#	Still X	Substance	Special Equipment used				
I	FIRE SERVICE Injuries	Fatalities		OTHER Injuries	Fatalities	Rescues			
J	Mobile Property Type			Vehicle Stolen	Estimated total dollar loss				
	Year	Make	License #		Insurance Co.				
	Model	Color	V.I.N.		Total Insurance Claim Paid				
	If equipment involved in ignition	Year	Make	Model	Serial #				
K	Complex	Area of origin			Equipment involved in ignition				
L	Form of heat ignition	Form of Material Ignited			Type of Material Ignited				
M	Method of extinguishment	Level of fire origin			Number of stories				
N	Construction Type	Extent of damage (Flame)			O Extent of damage (Smoke)				
P	Detector Performance	Sprinkler performance			Avenue of smoke travel				
Q	If smoke spread beyond room of origin	Form of Material generating most smoke			Type of Material generating most smoke				
R	Weather Rain	Temp 43 °F	Officer in Charge Capt. David Lowry						

INCIDENT REPORT

WAKEFIELD FIRE DEPARTMENT

Officer in Charge

Apparatus Response	ENG 1
Equipment used	

Details of Incident

RESPONDED TO A CALL FROM CAPT SULLIVAN TO INVESTIGATE AN ODOR OF GAS. ENGINE 1 RESPONDED AND CHECKED THE AREA WITH THE MULTI GAS DETECTOR AND FOUND NOTHING, BELIEVE THE ODOR TO BE COMING FROM DRIED OUT FLOOR DRAINS. THE GAS DEPT RESPONDED AND ALSO CHECKED THE AREA.